Complete Summary

GUIDELINE TITLE

Hypertension diagnosis and treatment.

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2003 Apr. 47 p. [92 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Hypertension

GUIDELINE CATEGORY

Diagnosis
Evaluation
Risk Assessment
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Geriatrics
Internal Medicine
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To increase the percentage of patients in blood pressure control
- To improve the assessment of patients with hypertension
- To increase the percentage of patients not at blood pressure goal who have a change in subsequent therapy
- To increase the percentage of patients with hypertension who receive patient education, especially in the use of non-pharmacological treatments

TARGET POPULATION

Adults age 18 or older

INTERVENTIONS AND PRACTICES CONSIDERED

1. History and physical examination, including 2 or more blood pressure measurements separated by 2 minutes in accordance with recommended techniques
2. Laboratory screen, including complete blood count, potassium, creatinine, glucose, urinalysis, lipid profile (total cholesterol, high-density lipoprotein [HDL] and triglycerides)
3. Electrocardiogram (ECG)
4. Risk stratification and treatment based on blood pressure level, presence or absence of target organ damage, and other risk factors, such as smoking, dyslipidemia, and diabetes
5. Evaluation for secondary hypertension
6. Lifestyle modifications, including weight reduction and maintenance, moderation of dietary sodium, moderation of alcohol intake, high dietary potassium intake, the DASH diet, tobacco avoidance, relaxation and stress management
7. Drug therapy, including thiazide diuretics, beta-blockers, angiotensin-converting enzyme inhibitors, calcium channel blockers, and angiotensin receptor blockers
8. Patient education
9. Referral for consultation for resistant hypertension
10. Follow-up and continuing care

MAJOR OUTCOMES CONSIDERED

- Risk of non-fatal and fatal cardiovascular disease in individuals with hypertension
- Morbidity and mortality from cardiovascular disease in individuals with hypertension

- Adequate control of blood pressure (<140 mm Hg systolic and <90 mm Hg diastolic)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Key conclusions (as determined by the work group) are supported by a conclusion grading worksheet that summarizes the important studies pertaining to the conclusion. Individual studies are classed according to the system presented below, and are designated as positive, negative, or neutral to reflect the study quality.

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of any significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is some uncertainty attached to the conclusion because of inconsistencies among the results from the studies or because of minor doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusion because of inconsistencies among the results of different studies or

because of serious doubts about generalizability, bias, design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

Grade Not Assignable: There is no evidence available that directly supports or refutes the conclusion.

Study Quality Designations:

The quality of the primary research reports and systematic reviews are designated in the following ways on the conclusion grading worksheets:

Positive: indicates that the report or review has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis.

Negative: indicates that these issues (inclusion/exclusion, bias, generalizability, and data collection and analysis) have not been adequately addressed.

Neutral: indicates that the report or review is neither exceptionally strong nor exceptionally weak.

Not Applicable: indicates that the report is not a primary reference or a systematic review and therefore the quality has not been assessed.

Classes of Research Reports:

A. Primary Reports of New Data Collection:

   Class A:

   - Randomized, controlled trial

   Class B:

   - Cohort study

   Class C:

   - Non-randomized trial with concurrent or historical controls
   - Case-control study
   - Study of sensitivity and specificity of a diagnostic test
   - Population-based descriptive study

   Class D:

   - Cross-sectional study
   - Case series
   - Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Institute Partners: System-Wide Review

The guideline draft, discussion, and measurement specification documents undergo thorough review. Written comments are solicited from clinical,

measurement, and management experts from within the member medical groups during an eight-week period of "Critical Review."

Each of the Institute's participating medical groups determines its own process for distributing the guideline and obtaining feedback. Clinicians are asked to suggest modifications based on their understanding of the clinical literature coupled with their clinical expertise. Representatives from all departments involved in implementation and measurement review the guideline to determine its operational impact. Measurement specifications for selected measures are developed by the Institute for Clinical Systems Improvement (ICSI) in collaboration with participating medical groups following general implementation of the guideline. The specifications suggest approaches to operationalizing the measure.

Guideline Work Group: Second Draft

Following the completion of the "Critical Review" period, the guideline work group meets 1-2 times to review the input received. The original guideline is revised as necessary and a written response is prepared to address each of the suggestions received from medical groups. Two members of the Cardiovascular Steering Committee carefully review the Critical Review input, the work group responses, and the revised draft of the guideline. They report to the entire committee their assessment of two questions: (1) Have the concerns of the medical groups been adequately addressed? (2) Are the medical groups willing and able to implement the guideline? The committee then either approves the guideline for pilot testing as submitted or negotiates changes with the work group representative present at the meeting.

Pilot Test

Medical groups introduce the guideline at pilot sites, providing training to the clinical staff and incorporating it into the organization's scheduling, computer, and other practice systems. Evaluation and assessment occur throughout the pilot test phase, which usually lasts for three months. Comments and suggestions are solicited in the same manner as used during the "Critical Review" phase.

The guideline work group meets to review the pilot sites' experiences and makes the necessary revisions to the guideline, and the Cardiovascular Steering Committee reviews the revised guideline and approves it for implementation.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Please note: This guideline has been updated. The National Guideline Clearinghouse is working to update this summary. The recommendations that follow are based on the previous version of the guideline.

The recommendations for the diagnosis and treatment of hypertension are presented in the form of an algorithm with 15 components, accompanied by detailed annotations. An algorithm is provided for Hypertension Diagnosis and

Treatment. Clinical highlights and selected annotations (numbered to correspond with the algorithm) follow.

Class of evidence (A-D, M, R, X) ratings and key conclusion grades (I-III, Not Assignable) are defined at the end of the Major Recommendations field.

Clinical Highlights for Individual Clinicians

1. Confirmation of hypertension is based on the initial visit, plus two follow-up visits with at least two blood pressure measures at each visit. (Annotation #2)
2. Standardized blood pressure measurement techniques should be employed when confirming an initially elevated blood pressure (BP) and for all subsequent measures during follow-up and treatment for hypertension. (Annotation #2, Annotation Appendix B - see original guideline document)
3. Initial evaluation includes lab studies, risk stratification, and adequate staging of hypertension. (Annotation #3, Annotation Appendix A - see original guideline document)
4. Recent evidence demonstrates that a diet low in sodium and rich in fruits, vegetables, and low fat dairy products will lower blood pressure. (Annotation #9)
5. A thiazide-type diuretic should be considered as initial therapy in most patients. (Annotation #9)
6. Physician reluctance to intensify treatment is a major obstacle to achieving treatment goals. (Annotation #9)
7. Systolic blood pressure level should be the major factor for the detection, evaluation, and treatment of hypertension, especially in adults 60 years and older. (Annotation #10)

Hypertension Diagnosis and Treatment Algorithm Annotations

2. Confirm Elevated Blood Pressure

   If an elevated blood pressure reading has been obtained (as the result of routine blood pressure screening - see the National Guideline Clearinghouse [NGC] summary of the Institute for Clinical Systems Improvement [ICSI] Preventive Services for Adults guideline), the blood pressure level should be confirmed. Confirmation is based on the initial visit plus two follow-up visits with at least 2 blood pressure readings at each visit. Explain the rationale, and emphasize the reason for return and the need for confirmation of elevated blood pressure. Unconfirmed hypertension should be coded as indicated in the original guideline document. Confirmation and follow-up recommendations are noted in the Joint National Committee VI Tables 2 and 3 in the original guideline document.

   Standardized blood pressure technique should be employed when confirming an elevated reading and for all subsequent readings during follow-up and treatment for hypertension. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Confirmed elevated blood pressure should be classified as to the appropriate hypertension stage. See Joint National Committee VI Tables 2 and 3 in the original guideline document.

Evidence supporting this recommendation is of classes: A, C, R

3. Complete Initial Assessment: Evaluate, Accurately Stage, and Risk Stratify

   The evaluation should determine if the patient has primary or secondary hypertension, target organ disease, or other cardiovascular risk factors. (Risk stratification)

   A. Medical History

      The history should focus on modifiable lifestyle factors including weight change, dietary intake of sodium and cholesterol, level of exercise, psychosocial stressors, and patterns of alcohol and tobacco use.

      Determine all medications being used--including herbal supplements, over-the-counter, prescription, and illicit drugs--as many agents may temporarily elevate blood pressure and/or adversely affect blood pressure control.

      A family history of hypertension, cardiovascular disease, cerebrovascular disease, diabetes mellitus, and dyslipidemia should be documented.

      Assess for symptoms and signs of target organ disease and secondary hypertension via a directed history and exam.

   B. Physical Examination

      The initial physical examination should include the following:

      - 2 or more blood pressure measurements separated by 2 minutes with the patient seated and after standing for at least 2 minutes in accordance with the recommended techniques mentioned earlier
      - verification in the contralateral arm (if values are different, the higher value should be used)
      - measurement of height, weight, and waist circumference
      - funduscopic examination for hypertensive retinopathy (i.e., arteriolar narrowing, focal arteriolar constrictions, arteriovenous crossing changes, hemorrhages and exudates, disc edema)
      - examination of the neck for carotid bruits, distended veins, or an enlarged thyroid gland
      - examination of the heart for abnormalities in rate and rhythm, increased size, precordial heave, clicks, murmurs, and third and fourth heart sounds

- examination of the lungs for rales and evidence for bronchospasm
- examination of the abdomen for bruits, enlarged kidneys, masses, and abnormal aortic pulsation
- examination of the extremities for diminished or absent peripheral arterial pulsations, bruits, and edema
- neurological assessment

C. Initial Laboratory Studies

Initial lab screen should include potassium, creatinine, glucose, urinalysis, lipid profile (total cholesterol, high density lipoprotein [HDL]-cholesterol, and triglycerides) and electrocardiogram (ECG). Additional laboratory and diagnostic studies may be required in individuals with suspected secondary hypertension and/or evidence of target-organ disease.

Some of these tests are needed for determining severity of cardiovascular disease and possible causes of hypertension. Others relate to cardiovascular risk factors or provide baseline values for judging biochemical effects of therapy.

Additional tests may be ordered at the discretion of the provider based on clinical findings. These may include but are not limited to complete blood count (CBC), chest x-ray, uric acid, urine microalbumin, and blood calcium.

See Annotation Appendix A, "Clinical Evaluation of Confirmed Hypertension" in the original guideline document.

D. Accurately Stage

This treatment guideline is designed to be used in new or previously diagnosed hypertensive patients in conjunction with the NGC summary of the ICSI Preventive Services for Adults guideline. See Annotation Appendix B, "Standards for Blood Pressure Measurement," in the original guideline document.

Hypertension Stages	Systolic		Diastolic
High-Normal	130-139	or	85-89
Stage 1	140-159	or	90-99
Stage 2	160-179	or	100-109
Stage 3	≥180	or	≥110

When systolic and diastolic pressures fall into different categories, the higher category should be selected in classifying the individual's blood pressure status.

E. Risk Stratification

The risk for cardiovascular disease in patients with hypertension is determined not only by the level of blood pressure but also by the presence or absence of target organ damage or other risk factors such as smoking, dyslipidemia, and diabetes, as shown excerpted from Table 4 in the Joint National Committee VI (JNC VI). These factors independently modify the risk for subsequent cardiovascular disease, and their presence or absence is determined during the routine evaluation of patients with hypertension (i.e., history, physical examination, laboratory tests).

JNC VI Table 4. Components of Cardiovascular Risk Stratification in Patients with Hypertension*

Major Risk Factors

- Smoking
- Dyslipidemia
- Diabetes mellitus
- Age >60 years
- Sex (men and postmenopausal women)
- Family history of cardiovascular disease: women <65 years or men <55 years

Target Organ Damage/Clinical Cardiovascular Disease

- Heart diseases
  - Left ventricular hypertrophy
  - Angina or prior myocardial infarction
  - Prior coronary revascularization
  - Heart failure
- Stroke or transient ischemic attack
- Nephropathy
- Peripheral arterial disease
- Retinopathy

*See JNC VI Table 5.

Based on the assessment of risk factors, target organ disease, and the level of blood pressure, the patient's risk group can be determined, shown in JNC VI Table 5. This empiric classification stratifies patients with hypertension into risk groups for therapeutic decisions. The World Health Organization (WHO) Expert Committee on Hypertension Control recently recommended a similar approach. Obesity and physical inactivity are also predictors of cardiovascular risk and interact with

other risk factors, but they are of less significance in the selection of initial therapy choice.

JNC VI Table 5. Risk Stratification and Treatment*

Blood Pressure Stages (mm Hg)	Risk Group A (No Risk Factors; No TOD/CCD**)	Risk Group B (At Least 1 Risk Factor, not Including Diabetes; No TOD/CCD)	Risk Group C (TOD/CCD and/or Diabetes, With or Without Other Risk Factors)
High normal (130-139/85-89)	Lifestyle modification	Lifestyle modification	Lifestyle plus drug therapy****
Stage 1 (140-159/90-99)	Lifestyle modification (up to 12 months)	Lifestyle modification*** (up to 6 months)	Lifestyle plus drug therapy
Stages 2 and 3 ($\geq$160/$\geq$100)	Lifestyle plus drug therapy	Lifestyle plus drug therapy	Lifestyle plus drug therapy

*Note: For example, a patient with diabetes and a blood pressure of 142/94 mm Hg plus left ventricular hypertrophy should be classified as having stage 1 hypertension with target organ disease (left ventricular hypertrophy) and with another major risk factor (diabetes). This patient would be categorized as "Stage 1, Risk Group C," and recommended for immediate initiation of pharmacologic treatment. Lifestyle modification should be adjunctive therapy for all patients recommended for pharmacologic therapy.

**TOD/CCD indicates target organ disease/clinical cardiovascular disease (see JNC VI Table 4).

***For patients with multiple risk factors, clinicians should consider drugs as initial therapy plus lifestyle modifications.

****For those with heart failure, renal sufficiency, or diabetes.

A point scale approach for estimating coronary heart disease risk can also be used. Refer to Annotation Attachment D in the original guideline document.

Evidence supporting this recommendation is of classes: B, R

4. Is Secondary Cause Suspected?

Evaluate for features suggestive of secondary hypertension. Suspect a diagnosis of secondary hypertension in patients with an abrupt onset of symptomatic hypertension, with Stage 3 hypertension, hypertensive crisis, sudden loss of blood pressure control after many years of stability on drug therapy, drug resistant hypertension, and in those individuals with no family history of hypertension. Differential diagnosis of secondary hypertension includes:

- Drugs (oral contraceptives, non-steroid, anti-inflammatory drugs)
- Renal parenchymal disease
- Renovascular disease
- Primary aldosteronism
- Cushing's syndrome
- Pheochromocytoma
- Aortic coarctation
- Obesity
- Obstructive sleep apnea

See Annotation Appendix C, "Suspicion of Secondary Hypertension," in the original guideline document.

Note recommendations for additional diagnostic procedures. Be sure advanced testing is correctly chosen and done properly to avert the need for repeat studies. This may require discussion with or referral to a specialist.

5. Order Additional Work-Up, Consider Referral

   Consider appropriate referral or additional workup if secondary hypertension is identified, or suspected.

   Evidence supporting this recommendation is of class: R

6. Treatment of Risk Group A

   Risk Group A consists of individuals who do not have clinical cardiovascular disease, target organ damage, or other risk factors. Persons with high-normal blood pressure should receive counseling on lifestyle modifications. This approach has been demonstrated to lower blood pressure and to prevent progression to established hypertension. Persons with Stage 1 hypertension in Risk Group A are candidates for a long-term trial (up to 1 year) of vigorous lifestyle modification with vigilant blood pressure monitoring. If goal blood pressure is not achieved, pharmacologic therapy should be added. For those with Stage 2 or Stage 3 hypertension, drug therapy is warranted, along with lifestyle modification as initial therapy.

   Evidence supporting this recommendation is of classes: A, R

7. Treatment of Risk Group B

   Risk Group B includes patients with hypertension who do not have clinical cardiovascular disease or target organ damage but have one or more of the risk factors shown in Joint National Committee VI Table 4, but not diabetes mellitus. This group contains the large majority of patients with high blood pressure. Lifestyle modification and management of reversible risk factors are the initial approach for patients with high-normal or Stage I hypertension. If multiple risk factors are present, clinicians should consider antihypertensive drugs as initial therapy in addition to lifestyle changes for patients with Stage I hypertension.

8. Treatment of Risk Group C

Risk Group C includes patients with hypertension who have known cardiovascular disease or target organ damage, or diabetes, with or without other risk factors or target organ disease, as delineated in Joint National Committee VI Table 4. It is the clinical opinion of the Joint National Committee VI Executive Committee that in Risk Group C, patients who have high-normal blood pressure and renal insufficiency, heart failure, or diabetes mellitus should be considered for prompt pharmacologic therapy. Appropriate lifestyle modifications always should be recommended as adjunct treatment.

This classification (blood pressure stage and risk grouping) is directly linked to treatment and treatment goals. It provides practicing clinicians with a simple method of identifying risk strata for individual patients (by history, physical examination, and routine laboratory testing) as well as guidelines for treatment of those patients. From these findings, an assessment of absolute risk can be made. Tables, formulas, computer software programs, and World Wide Web sites are available for calculating cardiovascular risk in individual patients by means of data from epidemiologic studies.

9. Lifestyle Modifications +/- Drug Therapy

Clinical studies show that the blood pressure lowering effects of lifestyle modifications can be equivalent to drug monotherapy. Lifestyle modification is best initiated and sustained through an educational partnership between the patient and a multidisciplinary health care team. While team members may vary by clinical setting, behavior change strategies should include nutrition, exercise, and smoking cessation services. Lifestyle modifications should be reviewed and re-emphasized at least annually.

Some patient education should occur and be documented at every visit. For recommended education messages, see Annotation Appendix E, "Recommended Education Messages," in the original guideline document.

Weight reduction and maintenance

> Elevated blood pressure is closely correlated with excess body weight. A significant number of individuals who are both hypertensive and overweight can lower blood pressure with weight reduction. This effect is usually evident in the early stages of weight loss and frequently occurs with only a 10 pound reduction in weight.
>
> Evidence supporting this recommendation is of classes: A, C, R

Moderation of Dietary Sodium

> A relationship between dietary sodium intake and blood pressure has been demonstrated in clinical and epidemiological studies.

Individuals vary in their response to a reduced sodium intake. (Blacks, older patients, and those with renal disease are more sodium sensitive.) However, when sodium intake is reduced, antihypertensive medications can be more effective in all patients. The current recommendation is to lower dietary sodium intake to less than 2300 mg (100 meq) per day.

Encourage patients to lower their sodium intake by not adding table salt to their food or in cooking, by limiting processed, convenience, and fast foods, and by reading food labels for sodium content.

Evidence supporting this recommendation is of classes: A, M, R

Moderation of Alcohol Intake

Excessive alcohol intake can elevate blood pressure and make it more difficult to achieve blood pressure control with medications. Patients should not exceed a daily alcohol intake of 1 ounce of ethanol. (This amount is contained in 2 ounces of 100 proof whiskey, 8 ounces of wine, or 24 ounces of beer.) Women and lighter-weight men should limit alcohol intake to no more than 0.5 ounces of alcohol per day.

Evidence supporting this recommendation is of classes: D, R

Adequate Physical Activity

Regular (3 to 5 times weekly) aerobic exercise at a mild to moderate pace for 30 to 45 minutes is optimal for cardiovascular benefit.

Evidence supporting this recommendation is of class: R

Potassium

The benefit of high dietary potassium intake is supported by epidemiologic data demonstrating an inverse relationship between potassium intake and blood pressure levels. High dietary potassium should be avoided in patients with chronic renal failure and patients on non-steroidal anti-inflammatory drugs (NSAIDs), angiotensin-converting enzyme (ACE) inhibitors, or potassium-sparing diuretics.

Evidence supporting this recommendation is of classes: A, M, R

The DASH Diet

A diet rich in fruits, vegetables, and low-fat dairy foods, with reduced saturated and total fats, significantly lowers blood pressure and may prevent or delay the onset of hypertension. These benefits are in addition to those of sodium restriction.

Evidence supporting this recommendation is of class: A

Tobacco Avoidance

Recent data using ambulatory blood pressure monitoring suggests that nicotine may indeed increase blood pressure and could account for some degree of blood pressure lability. In addition, it is a major risk factor for atherosclerotic cardiovascular disease. At each visit, establish tobacco use status and follow the NGC summary of the ICSI Tobacco Use Prevention and Cessation for Adults and Mature Adolescents guideline.

Evidence supporting this recommendation is of classes: C, M, R

Relaxation and Stress Management

Although studies have not demonstrated a significant long-term effect of relaxation methods on blood pressure reduction, relaxation therapy may enhance an individual's quality of life and may have independent effects on lowering coronary heart disease risk.

Drug Therapy

A thiazide-type diuretic should be considered as initial therapy in most patients. Diuretics have been shown to be as good as or superior to other classes of drug therapy in preventing cardiovascular disease (CVD) morbidity and mortality and are inexpensive. Thiazide-type diuretics are especially useful for patients age 55 years or older with hypertension and additional risk factors for cardiovascular disease and for patients age 60 years or older with isolated systolic hypertension. In patients for whom diuretics are contraindicated or poorly tolerated, use of a beta-blocker, angiotensin-converting enzyme inhibitor, angiotensin receptor blocker, or calcium antagonist is appropriate. Long-acting dihydropyridine calcium antagonists have been shown to be effective for patients age 60 years or older with isolated systolic hypertension. Co-existing medical conditions may also justify the use of one of these classes of drugs. An example is the use of an angiotensin-converting enzyme inhibitor in a patient with congestive heart failure or diabetic nephropathy. Other classes of drugs should be reserved for special situations or as additive therapy (see Annotation Appendix F, "Therapies" in the original guideline document.)

Many patients will require more than one drug for blood pressure control. Combination therapies that include a diuretic are often effective, lessen the risk for side-effects (by use of low doses of each component drug), and enhance adherence by simplification of the treatment program.

Other considerations when selecting initial drug therapy include age, race, cost, drug interactions, side-effects, and quality of life issues.

The lowest recommended dose of the chosen drug should be used initially. If tolerated, the dose can be increased or additional medications added to achieve goal blood pressure.

Evidence supporting this recommendation is of classes: A, B, R

10. Blood Pressure (BP) at Goal?

Goal office blood pressures should be <140 mm Hg systolic and <90 mm Hg diastolic for all adults. Goal blood pressures measured out of the office setting should be <135 mm Hg systolic and <85 mm Hg diastolic.

For patients with a history of congestive heart failure, goal office blood pressures are <130 mm Hg systolic and <85 mm Hg diastolic.

For patients with renal dysfunction and 24-hour urine protein excretion of ≥1 gram, goal office blood pressures are <125 mm Hg systolic and <75 mm Hg diastolic.

For patients with diabetes mellitus, goal office blood pressures are <130 mm Hg systolic and <80 mm Hg diastolic.

For patients 60 years or older with isolated systolic hypertension who have markedly increased systolic blood pressure levels prior to treatment, it may not be possible to lower systolic blood pressure to <140 mm Hg. An interim goal of 160 mm Hg or what can be achieved by optimal doses of 3 antihypertensive drugs would be reasonable. In addition, as systolic blood pressure is lowered, caution is advised to avoid lowering diastolic blood pressure to <65 mm Hg.

Systolic hypertension in patients age 60 and older is an important modifiable cardiovascular risk factor. [Conclusion Grade I: See Discussion Appendix A, Conclusion Grading Worksheet – Annotation #10 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for stage I (systolic blood pressure [SBP] 140-160 mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade III: See Discussion Appendix A, Conclusion Grading Worksheet – Annotation #10 (Isolated Systolic Hypertension) in the original guideline document.]

Drug treatment for stage II (SBP 160-180 mm Hg) or III (SBP 180+ mm Hg) systolic hypertension in patients age 60 and older is effective in reducing cardiovascular disease morbidity and mortality. [Conclusion Grade I: See Discussion Appendix A, Conclusion Grading Worksheet – Annotation #10 (Isolated Systolic Hypertension) in the original guideline document.]

Evidence supporting this recommendation is of classes: A, B, M, R

11. Change Treatment

If blood pressure goals are not met, the clinician has three options for subsequent therapy:

- Increase the dose of the initial drug toward maximal levels.
- Substitute an agent from another class.
- Add a second drug from another class.

Individualized drug selection is based on several principles:

- If the initial response to one drug is adequate, continue the same drug.
- If it is partial on one agent, increase the dose or add a second drug of a different class.
- If there is little response, substitute another single drug from a different class.
- Consider low dose diuretic use early or as a first addition.
- Consider loop diuretic agents instead of thiazide or thiazide-like diuretics when creatinine >2.0 mg%.
- Do not combine two drugs of the same class.
- The use of combination agents can be effective.

Evidence supporting this recommendation is of classes: A, R

12. BP at Goal?

If at this point acceptable response has not been achieved, several issues should be addressed or revisited. These include adherence to appropriate lifestyle modifications, consistent use of prescribed drugs, and tolerance of treatment modalities. Non-adherence rates to prescribed medications are estimated at 50%, and are slightly higher for elderly and adolescent patients. Since there is not a simple test to accurately measure adherence, there are some practical methods that can be used for all patients: asking the patient about missed doses, watching treatment response, and tracking missed appointments. Although patients will generally overestimate their adherence, simply asking the question will help identify up to 50% of low-adherence patients. Standardized instruction in self-blood pressure measurement will allow assessment of "white coat" syndrome (see the NGC summary of the ICSI Preventive Services for Adults guideline). Interfering substances which can adversely affect treatment include: non-steroidal anti-inflammatory drugs, oral contraceptives, sympathomimetics, antidepressants, glucocorticoids, nasal decongestants, licorice-containing substances (e.g.,

chewing tobacco), cocaine, cyclosporine, and erythropoietin. Intermittent use of alcohol, particularly in alcoholics who are binge drinkers, may cause difficulties with widely fluctuating blood pressures.

Non-specific symptoms such as fatigue, lightheadedness, or vaguely impaired cognition may be due to an acute decline in blood pressure level and may resolve within four to six weeks while continuing the drug. Other minor drug-related symptoms unrelated to blood pressure change may also resolve in time without discontinuing the drug. Non-office standardized blood pressure measurement is desirable to monitor blood pressure control.

13. Resistant Hypertension?

A patient has resistant hypertension when blood pressure goals are not met despite compliance with a triple drug regimen. The drug regimen should include a diuretic plus near maximal doses of two of the following classes of drugs:

- Beta-adrenergic-blocker or other anti-adrenergic agent
- Direct vasodilator
- Calcium channel-blocker
- Angiotensin-converting enzyme inhibitor
- Angiotensin receptor blocker

Evidence supporting this recommendation is of classes: A, D

14. Hypertension Consult

Consider hypertension consultation if a patient's blood pressure is not controlled on two medications or if secondary hypertension is suspected. All patients with blood pressure that is not controlled on three medications should be referred for consultation.

15. Hypertension Continuing Care

Once hypertension is controlled the patient should be seen at least annually by the provider to assess patient compliance, patient satisfaction, and any changes in target organ status. Lifestyle modifications should be reviewed, re-emphasized, and documented annually. Patients should monitor blood pressure more frequently by home monitoring or by other allied health professionals.

On follow-up visits, physical examination should be directed toward detection of hypertensive target organ damage and physical signs of common comorbidities.

One may consider decreasing the dosage or number of anti-hypertensive drugs while maintaining lifestyle modification if:

- Patient has uncomplicated hypertension that is well controlled.

- Blood pressure has been maintained and documented for at least 1 year.

Evidence supporting this recommendation is of class: M, R

Definitions:

Classes of Research Reports:

A. Primary Reports of New Data Collection:

Class A:

- Randomized, controlled trial

Class B:

- Cohort study

Class C:

- Non-randomized trial with concurrent or historical controls
- Case-control study
- Study of sensitivity and specificity of a diagnostic test
- Population-based descriptive study

Class D:

- Cross-sectional study
- Case series
- Case report

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Class M:

- Meta-analysis
- Systematic review
- Decision analysis
- Cost-effectiveness analysis

Class R:

- Consensus statement
- Consensus report
- Narrative review

Class X:

- Medical opinion

Conclusion Grades:

Grade I: The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of significant doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large samples to have adequate statistical power.

Grade II: The evidence consists of results from studies of strong design for answering the question addressed, but there is uncertainty attached to the conclusion because of inconsistencies among the results from different studies or because of doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the question addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: The evidence consists of results from studies of strong design for answering the question addressed, but there is substantial uncertainty attached to the conclusions because of inconsistencies among the results from different studies or because of serious doubts about generalizability, bias, research design flaws, or inadequacy of sample sizes. Alternatively, the evidence consists solely of results from a limited number of studies of weak design for answering the question addressed.

CLINICAL ALGORITHM(S)

A detailed and annotated clinical algorithm is provided for the Diagnosis and Treatment of Hypertension.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The guideline contains an annotated bibliography and discussion of the evidence supporting each recommendation. The type of supporting evidence is identified and classified for selected recommendations (see "Major Recommendations").

In addition, key conclusions contained in the Work Group's algorithm are supported by a grading worksheet that summarizes the important studies pertaining to the conclusion. The type and quality of the evidence supporting these key recommendations (i.e., choice among alternative therapeutic approaches) is graded for each study.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Adequate control of hypertension
- Prevention of end-organ damage due to hypertension

- Improved patient education about modifiable risk factors and in the use of non-pharmacological treatments

POTENTIAL HARMS

Potential side effects and drug interactions associated with pharmacological management of hypertension are provided in Annotation Attachment F – "Therapies" of the original guideline document.

CONTRAINDICATIONS

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Contraindications to specific types of pharmacological management of hypertension are provided in Annotation Appendix F – "Therapies," in the original guideline document.

QUALIFYING STATEMENTS

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These clinical guidelines are designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and are not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. A guideline will rarely establish the only approach to a problem.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Once a guideline is approved for general implementation, a medical group can choose to concentrate on the implementation of that guideline. When four or more groups choose the same guideline to implement and they wish to collaborate with others, they form a guideline action group.

In the action groups, each medical group sets specific goals they plan to achieve in improving patient care based on the particular guideline(s). Each medical group shares its experiences and supporting measurement results within the action group. This sharing facilitates a collaborative learning environment. Action group learnings are also documented and shared with interested medical groups within the collaborative.

Currently action groups may focus on one guideline or a set of guidelines such as hypertension, lipid treatment, and tobacco cessation.

Detailed measurement strategies are presented in the original guideline document to help close the gap between clinical practice and the guideline

recommendations. Summaries of the measures are provided in the National Quality Measures Clearinghouse (NQMC).

RELATED NQMC MEASURES

- Hypertension diagnosis and treatment: percentage of patients who have blood pressure less than 140/90 mm Hg at the clinic visit.
- Hypertension diagnosis and treatment: percentage of patients presenting in clinic within the last month for whom patient education about modifiable risk factors has been documented in the medical record.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2003 Apr. 47 p. [92 references]

ADAPTATION

Parts of this guideline were adapted from: The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Bethesda (MD): U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute; 1997 Nov. 33 p.

DATE RELEASED

1995 Jun (revised 2003 Apr)

GUIDELINE DEVELOPER(S)

Institute for Clinical Systems Improvement - Private Nonprofit Organization

GUIDELINE DEVELOPER COMMENT

Organizations participating in the Institute for Clinical Systems Improvement (ICSI): Affiliated Community Medical Centers, Allina Medical Clinic, Altru Health System, Aspen Medical Group, Avera Health, CentraCare, Columbia Park Medical Group, Community-University Health Care Center, Dakota Clinic, ENT Specialty Care, Fairview Health Services, Family HealthServices Minnesota, Family Practice Medical Center, Gateway Family Health Clinic, Gillette Children's Specialty Healthcare, Grand Itasca Clinic and Hospital, HealthEast Care System, HealthPartners Central Minnesota Clinics, HealthPartners Medical Group and Clinics, Hutchinson Area Health Care, Hutchinson Medical Center, Lakeview Clinic, Mayo Clinic, Mercy Hospital and Health Care Center, MeritCare, Mille Lacs Health System, Minnesota Gastroenterology, Montevideo Clinic, North Clinic, North Memorial Care System, North Suburban Family Physicians, Northwest Family Physicians, Olmsted Medical Center, Park Nicollet Health Services, Pilot City Health Center, Quello Clinic, Ridgeview Medical Center, River Falls Medical Clinic, Saint Mary's/Duluth Clinic Health System, St. Paul Heart Clinic, Sioux Valley Hospitals and Health System, Southside Community Health Services, Stillwater Medical Group, SuperiorHealth Medical Group, University of Minnesota Physicians, Winona Clinic, Ltd., Winona Health

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GUIDELINE COMMITTEE

Cardiovascular Steering Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

In the interest of full disclosure, the Institute for Clinical Systems Improvement (ICSI) has adopted a policy of revealing relationships work group members have with companies that sell products or services that are relevant to this guideline

topic. It is not assumed that these financial interests will have an adverse impact on guideline content. They simply are noted here to fully inform users of the guideline.

All work group members: none declared.

GUIDELINE STATUS

Please note: This guideline has been updated. The National Guideline Clearinghouse is working to update this summary.

This guideline updates a previous version: Institute for Clinical Systems Improvement (ICSI). Hypertension diagnosis and treatment. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2002 Jan. 42 p.

GUIDELINE AVAILABILITY

Electronic copies of the updated guideline: Available from the Institute for Clinical Systems Improvement (ICSI) Web site.

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Hypertension diagnosis and treatment. In: ICSI pocket guidelines. April 2003 edition. Bloomington (MN): Institute for Clinical Systems Improvement, 2003 Mar p. 94-101.
- Preventive services for adults. Bloomington (MN): Institute For Clinical Systems Improvement (ICSI); 2003 Sep. 50 p. See the National Guideline Clearinghouse (NGC) summary.
- Tobacco use prevention and cessation for adults and mature adolescents. Bloomington (MN): Institute For Clinical Systems Improvement (ICSI); 2003 Jul. 36 p. See the NGC summary.

Print copies: Available from ICSI, 8009 34th Avenue South, Suite 1200, Bloomington, MN 55425; telephone, (952) 814-7060; fax, (952) 858-9675; Web site: www.icsi.org; e-mail: icsi.info@icsi.org.

The following is also available:

- The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. JAMA 2003 May 21;289(19):2560-71.

Electronic copies: Available from the National Heart, Lung and Blood Institute (NHLBI) Web site.

Print copies: Available from NHLBI Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; e-mail: nhlbiic@dgsys.com.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 5, 1999. The information was verified by the guideline developer on July 6, 1999. This summary was updated by ECRI on April 19, 2001. The updated information was verified by the guideline developer as of June 28, 2001. This summary was updated again on June 18, 2002 and verified by the guideline developer on August 8, 2002. This summary was updated by ECRI most recently on January 28, 2004.

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